AIRS ARM Atmospheric State Best Estimate Status

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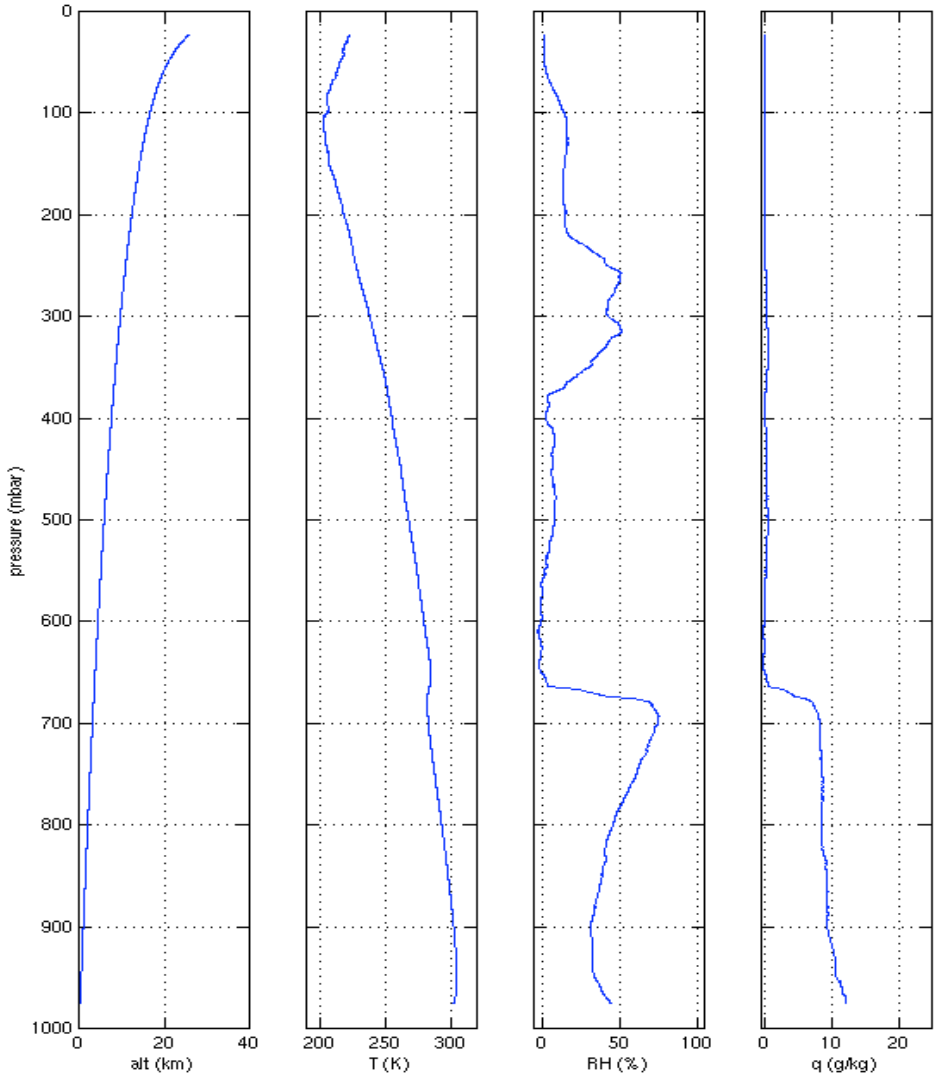
AIRS Science Team Meeting, 19-21 June 2001

AIRS ARM Atmospheric State Best Estimate

Example Quicklook Image

Best estimate profiles

- pressure
- temperature
- relative humidity
- water vapor mixing ratio
- surface skin temperature
- surface emissivity



AIRS ARM Atmospheric State Best Estimate

Status at previous AIRS STM, 20-22 Feb 2001

Algorithm Status:

- Fetches required ARM SGP radiosonde data
- Produces pressure, temperature, and water vapor profiles and their uncertainties for an input overpass time
- Produces a NetCDF file and quicklook images
- Sample files avaliable from ftp://tyler.ssec.wisc.edu/pub/outgoing/airs/

To Do:

- Produce profiles representative of the AMSU footprint by taking larger scale spatial gradients within the footprint into account using GOES and model data
- Modify upper level radiosonde water vapor profiles based on sonde/Raman Lidar comparisons
- Automation
- Test with MODIS TERRA overpasses
- Implement for ARM North Slope of Alaska and Tropical Western Pacific sites

Dave Tobin, UW-SSEC, 2/19/2000

AIRS ARM Atmospheric State Best Estimate.

Status AIRS STM 19-21 June 2001

- *SGP algorithm currently uses radiosondes, MWR, AERI+ retrieval, Vaisala ceiliometer, RUC-2 profiles, GOES-8 retrievals, surface and tower based in-situ sensor, and IRT data. Decision/logic tree based on data availability and cloudiness.*
- *Using hourly RUC-2 profiles for time interpolation between sondes for overcast conditions*
- *Large scale spatial gradients w/in AMSU FOV accounted for using GOES8 (clear) or RUC-2(cloudy) profiles*
- *Developing sonde/Raman lidar bias as a function of sonde T and sonde RH for upper level mods to sonde UTH*
- *SGP site converted to using RS-90 radiosondes as of 1 May 2001.*
- *Land surface emissivity estimates from AERI measurements of pure SGP surface types (vegetated and non-vegetated) combined with estimates of the vegetation cover as a function of day of year*
- *Surface temperature estimates from downlooking (from 10m) narrow-band 10□m radiometer (IRT) at CART site*
- *Cloud mask and heights provided by Vaisala ceiliometer*

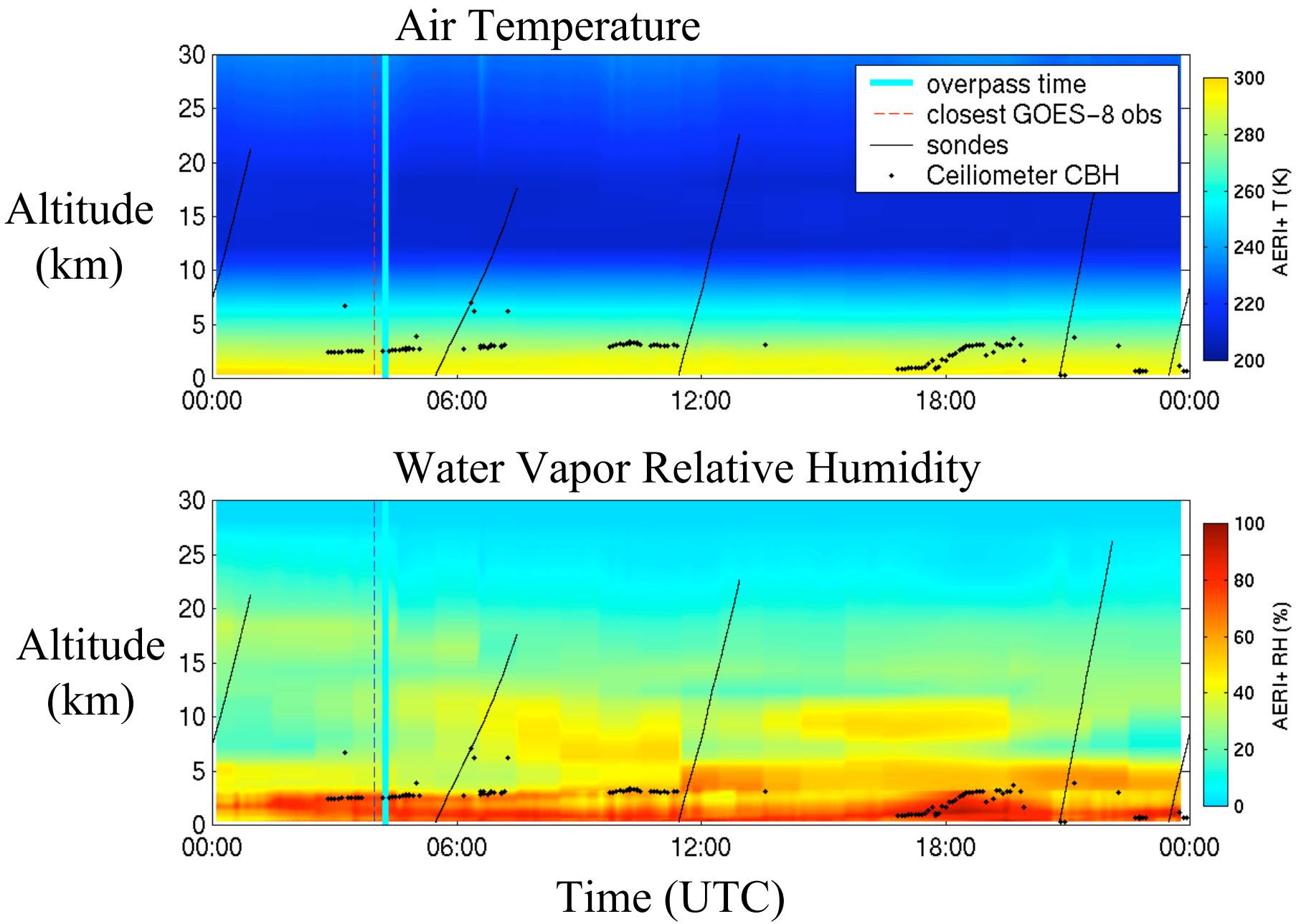
AIRS ARM Atmospheric State Best Estimate. Status

- *Simplified version of the algorithm run for selected clear sky Terra overpasses. TOA radiance calculations performed for GOES-8 and MODIS.*
- *Currently (11 June) receiving daily matchup files for simulated Aqua overpasses from NOAA. Overpass time, view angle, and FOV locations will be used to run the algorithm. Daily best estimate files will be available on an ftp site.*

To do :

- incorporate uncertainty estimates into data files
- account for radiosonde biases
- validate seasonal dependence of vegetation fraction
- validate accuracy and representativeness of measured surface temperature
- implement algorithm for NSA and TWP sites
- make AIRS/ARM best estimate data files available to team via an ftp site

AIRS ARM Atmospheric State Best Estimate



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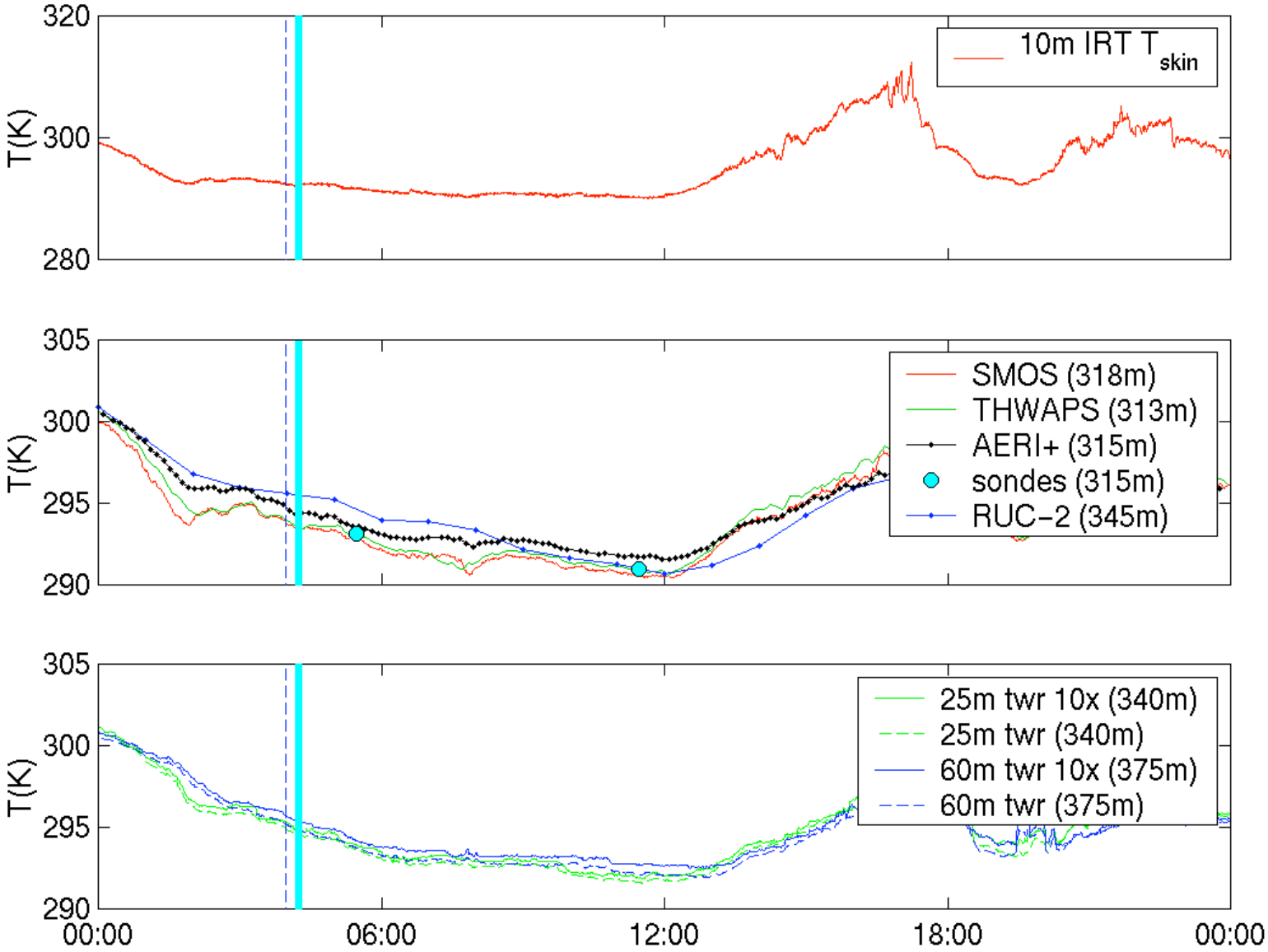

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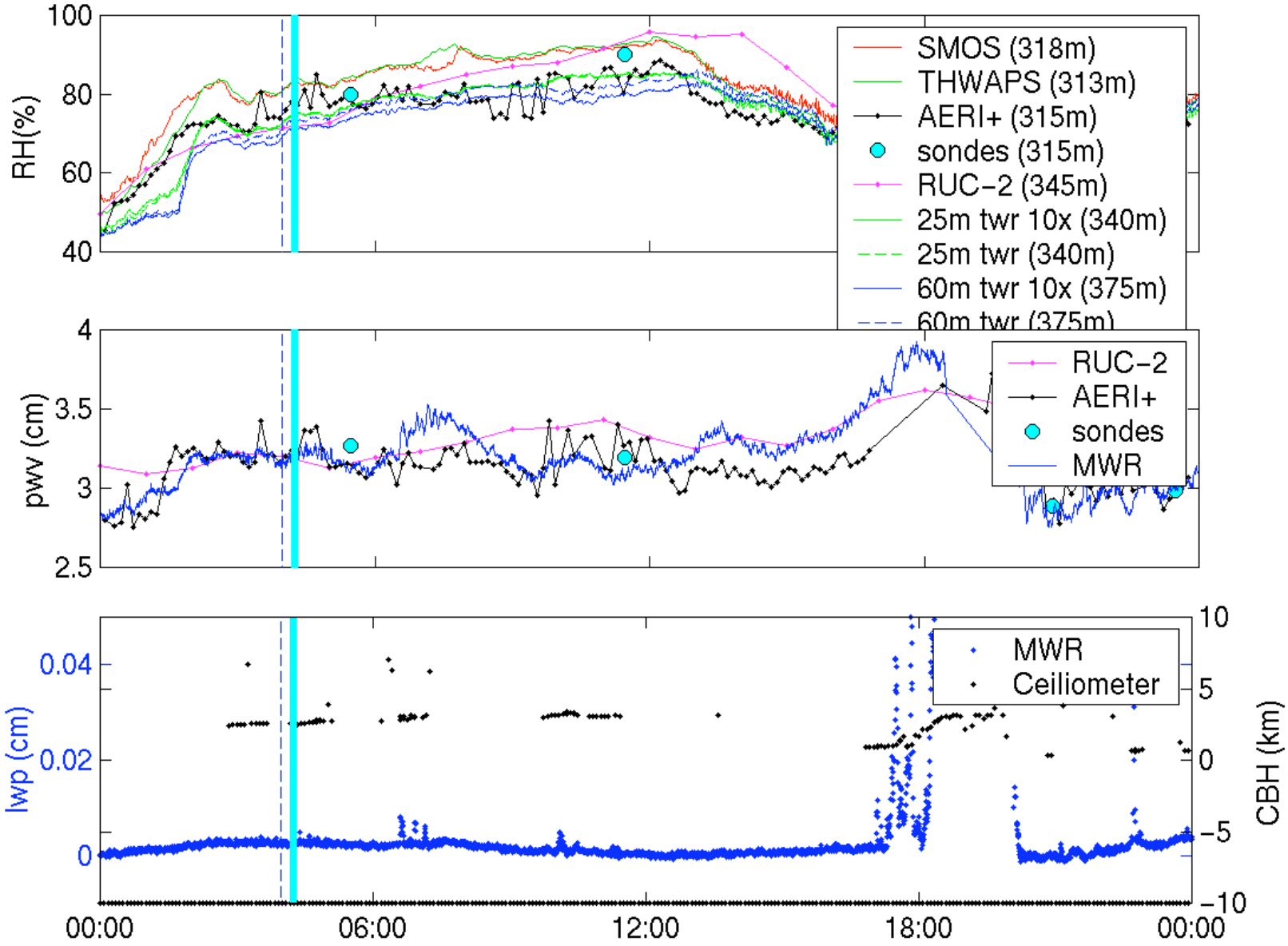

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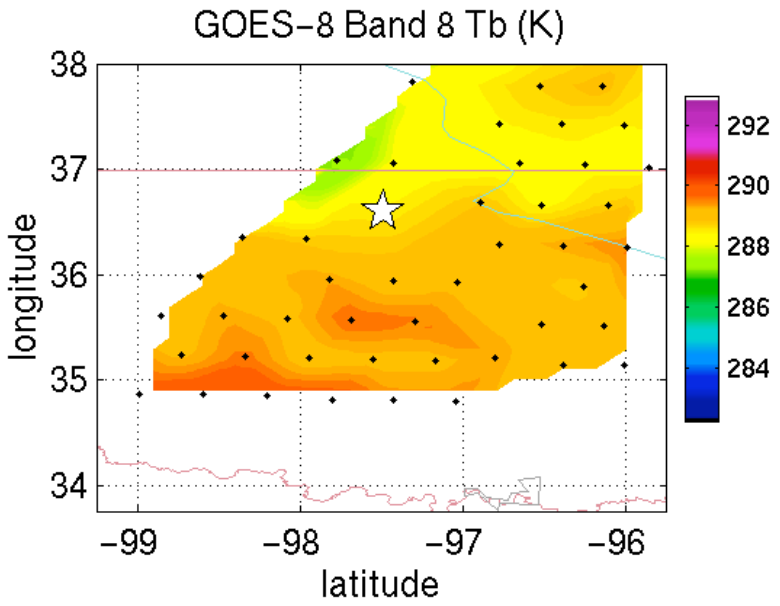

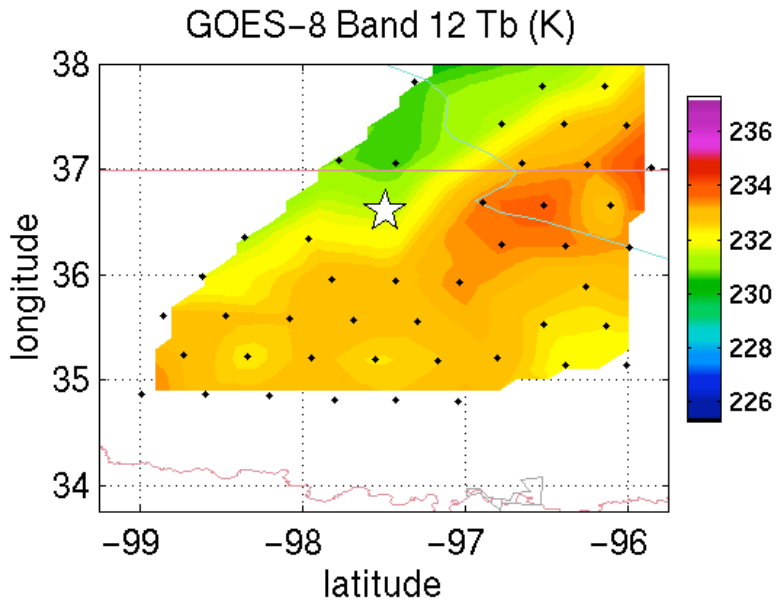

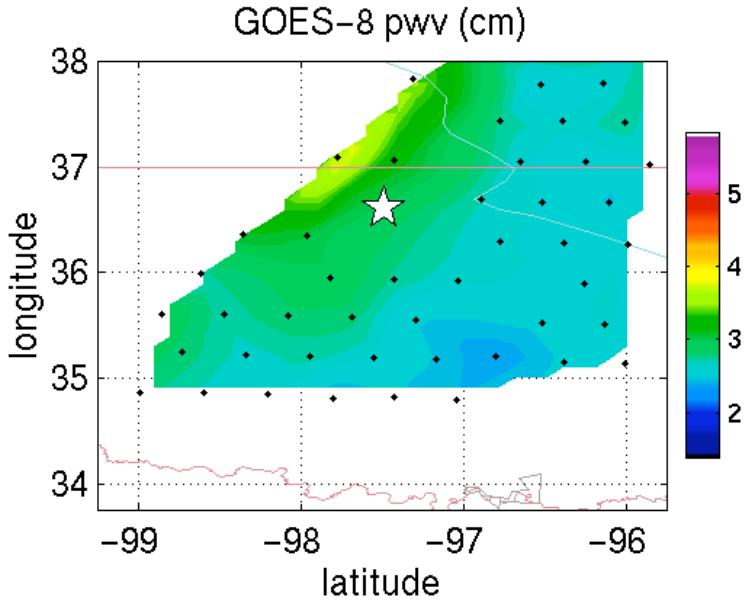

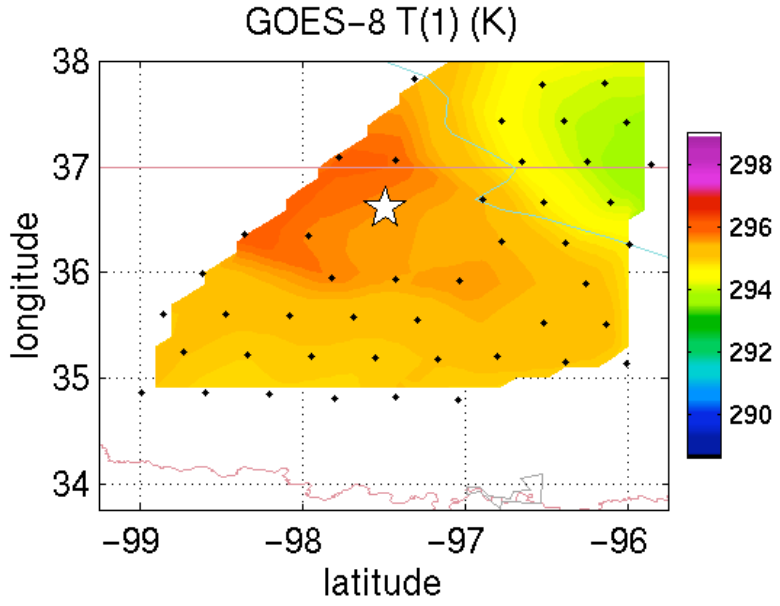

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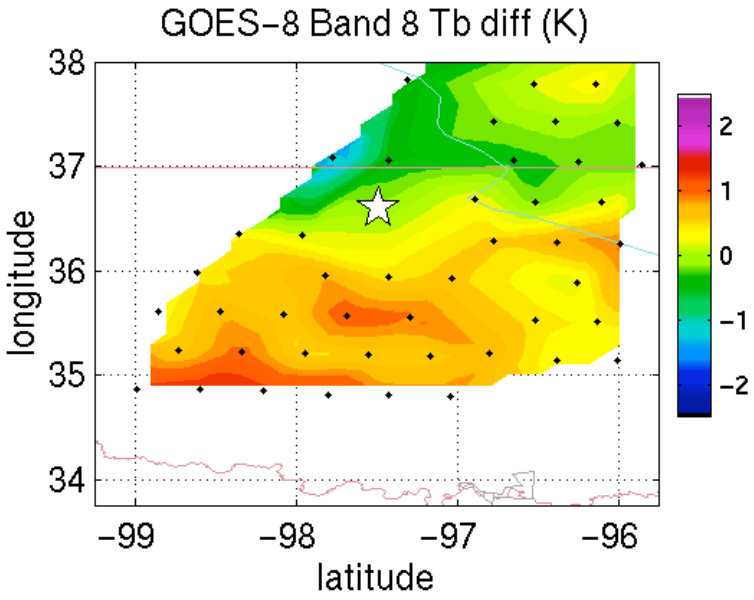
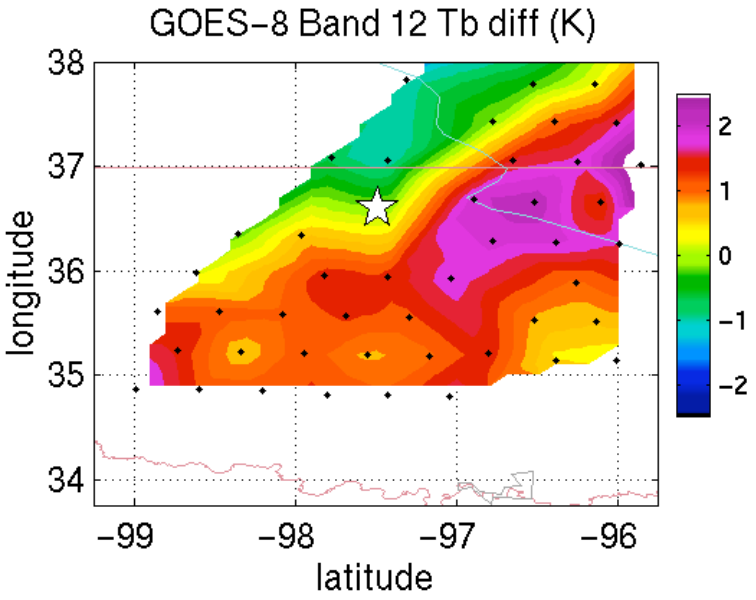
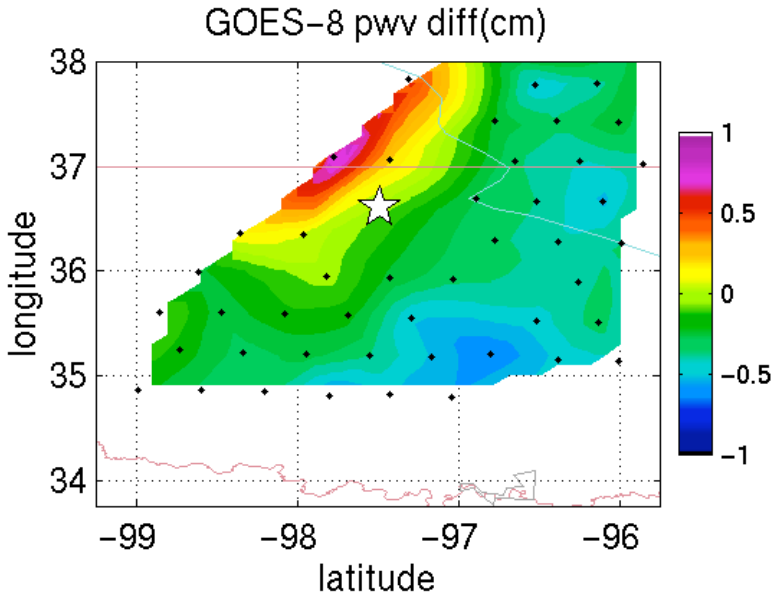
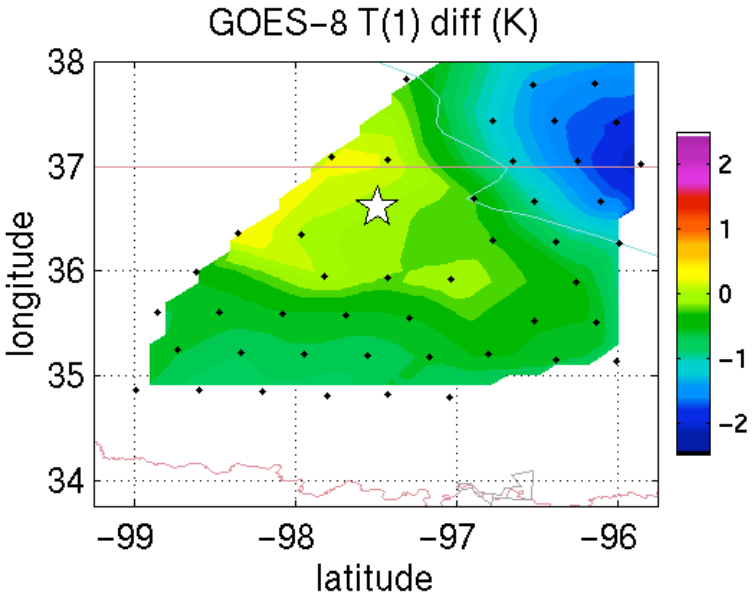


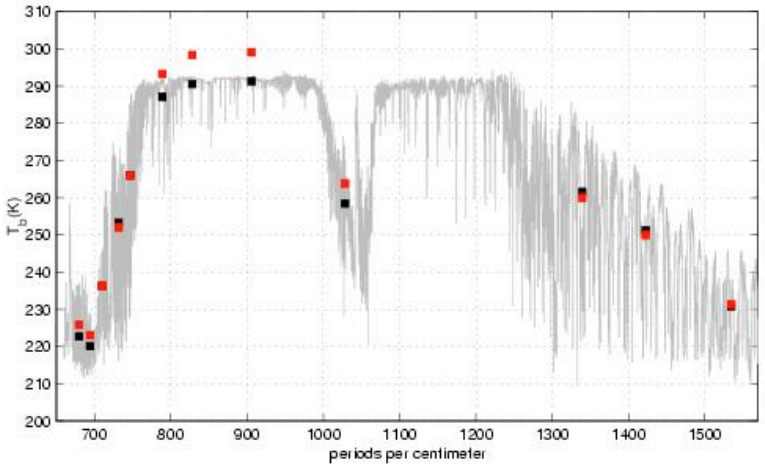


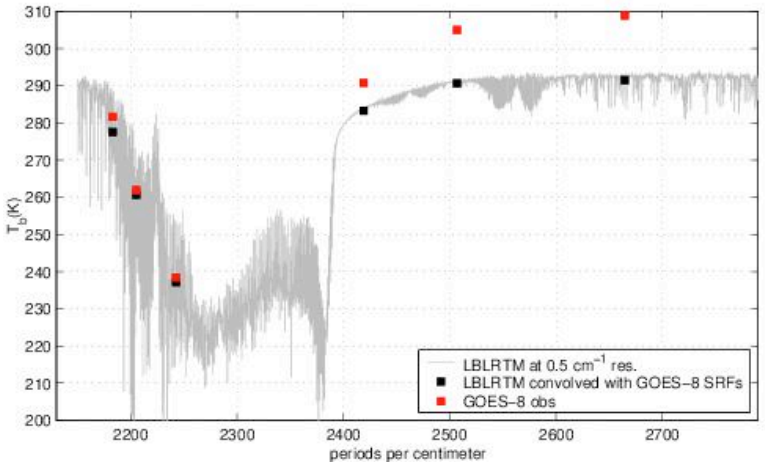


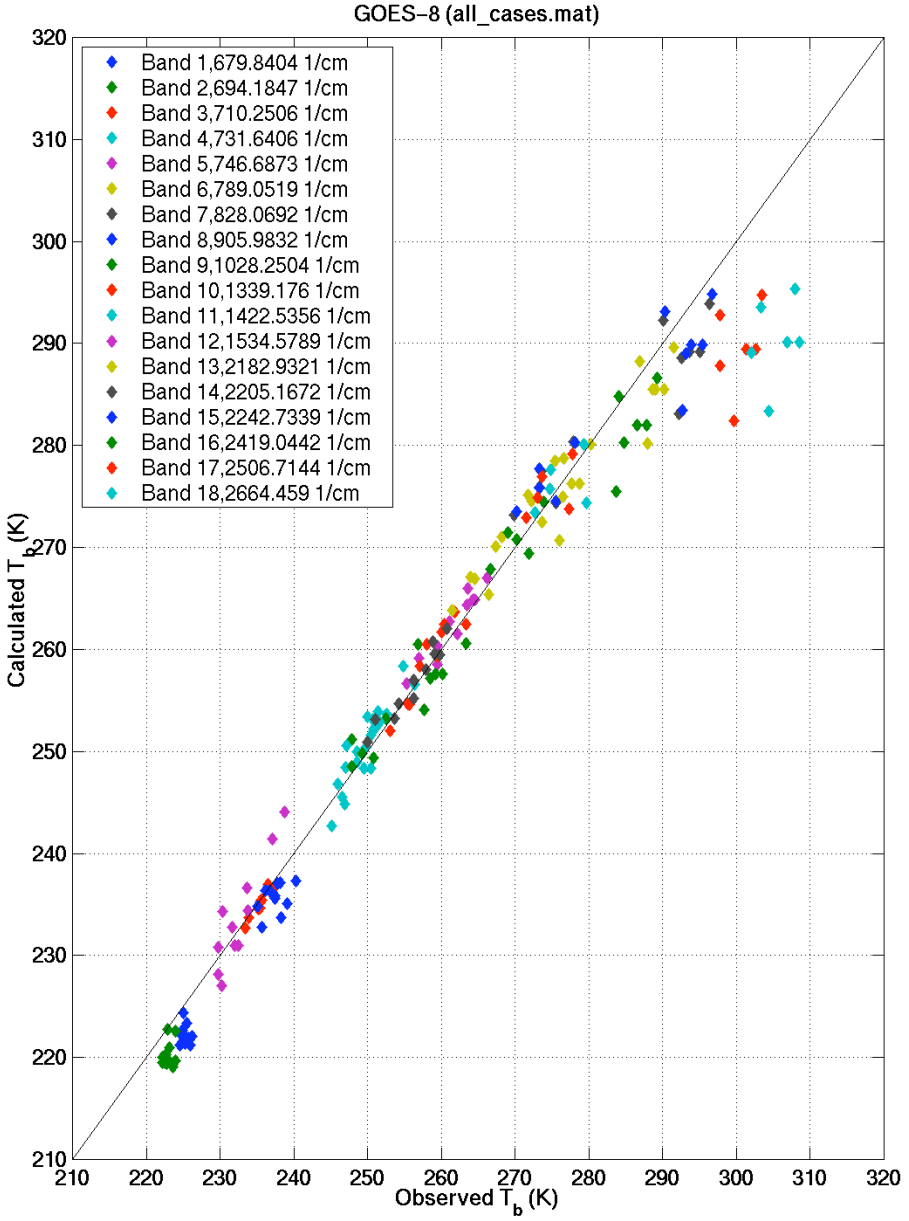


AIRS ARM Atmospheric State Best Estimate

Clear sky GOES-8, April 2001 cases
(Setting Skin Temp = Air Temp)

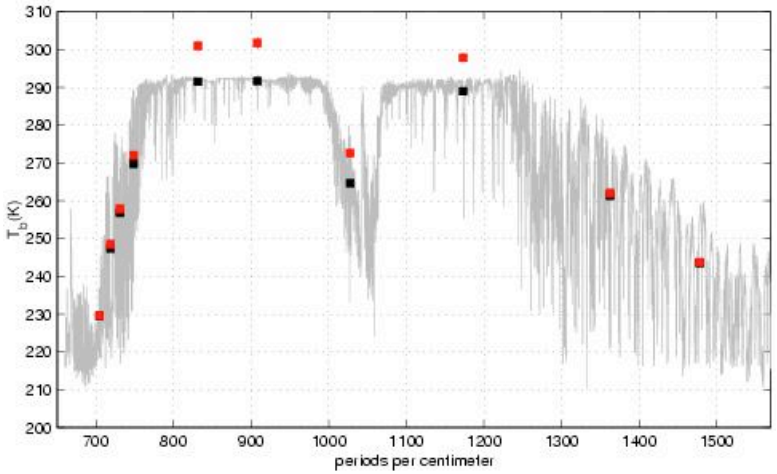


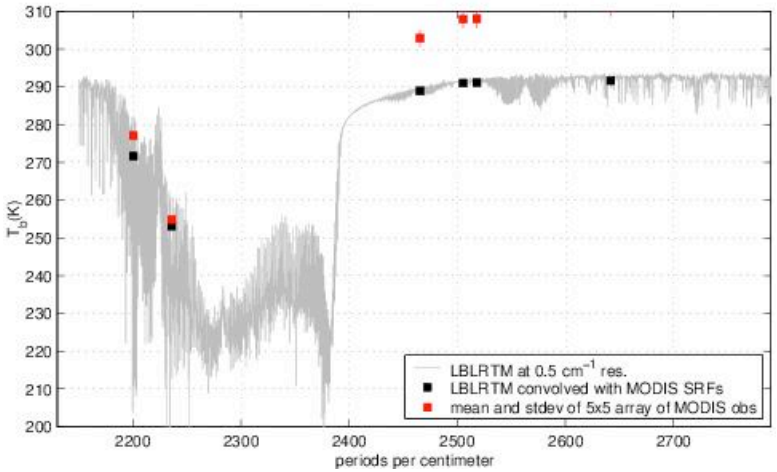


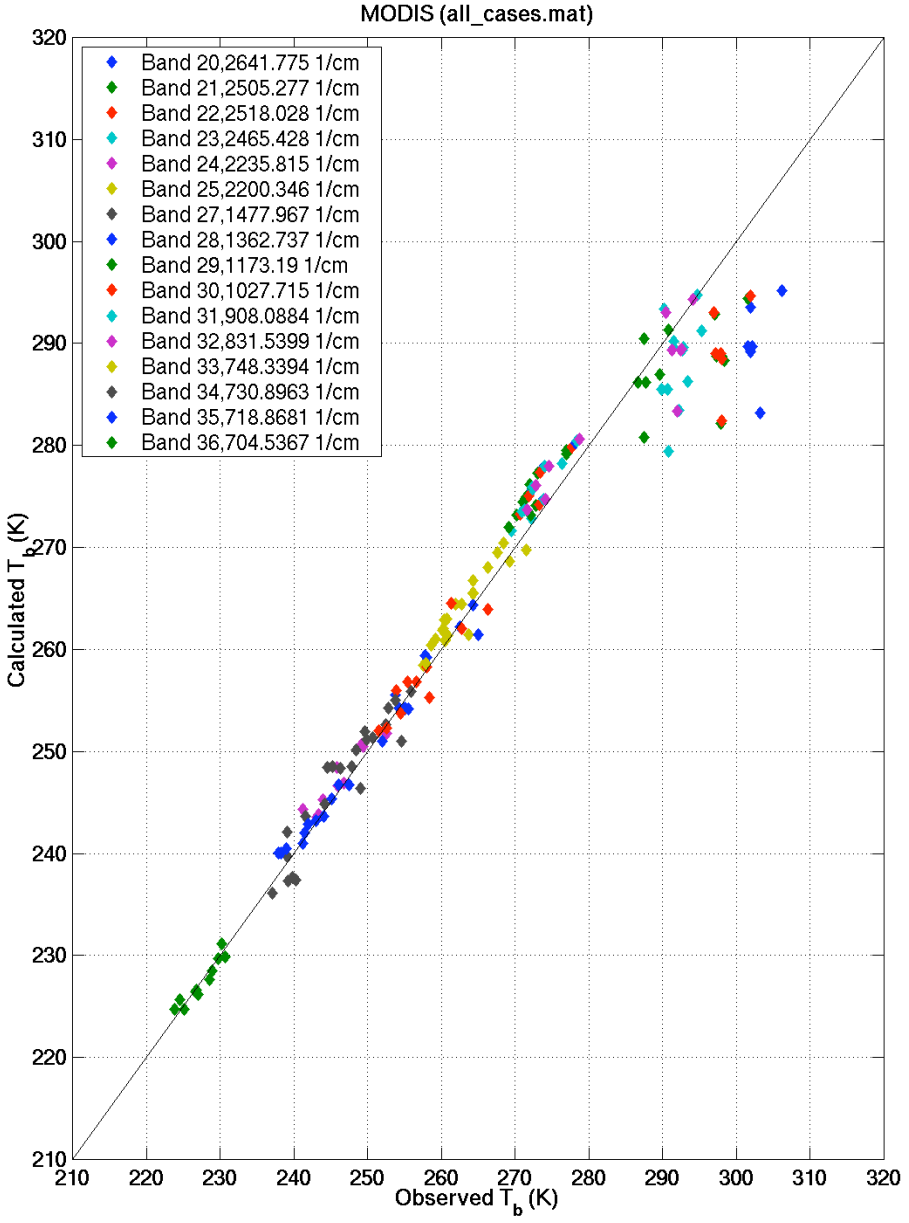


AIRS ARM Atmospheric State Best Estimate

Clear sky MODIS, April 2001 cases
(Setting Skin Temp = Air Temp)







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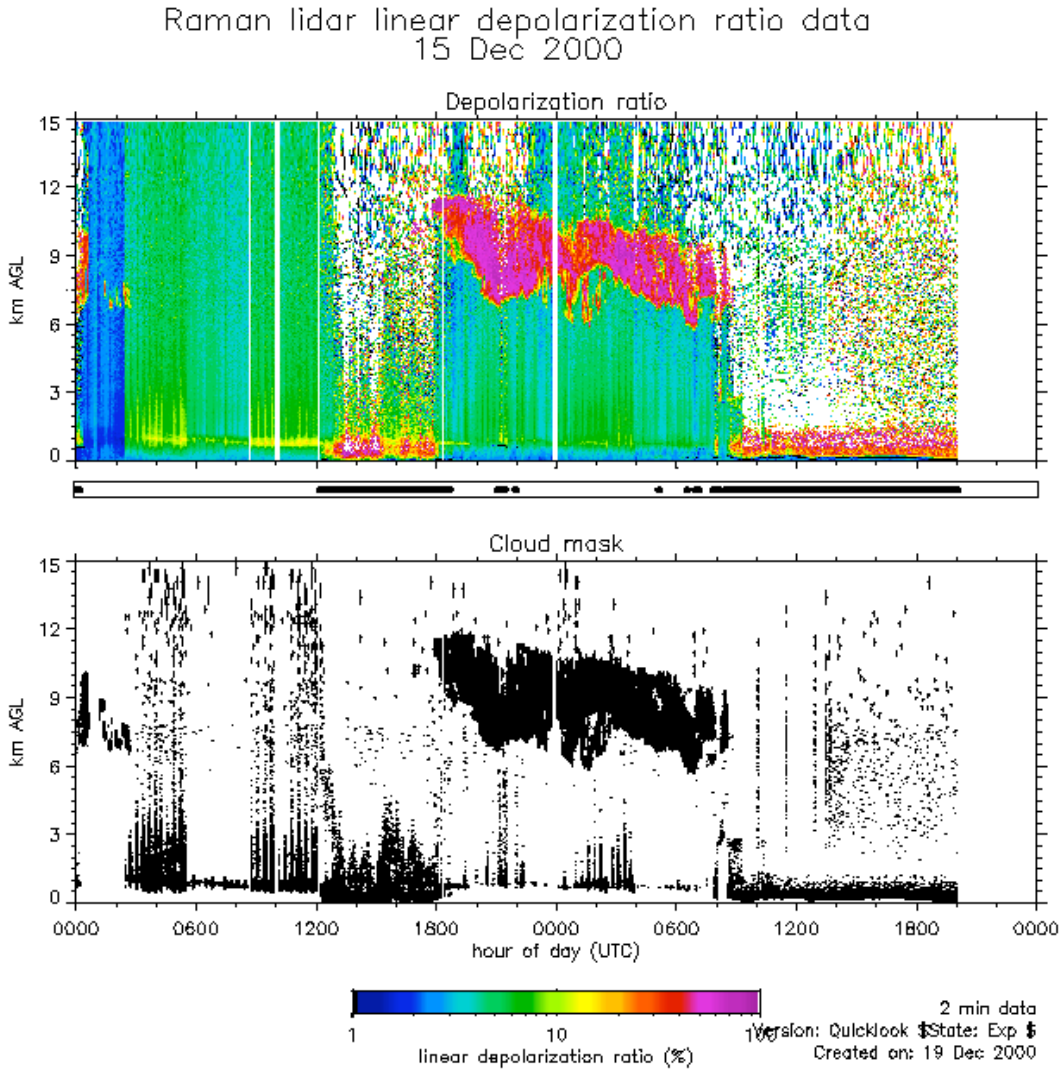
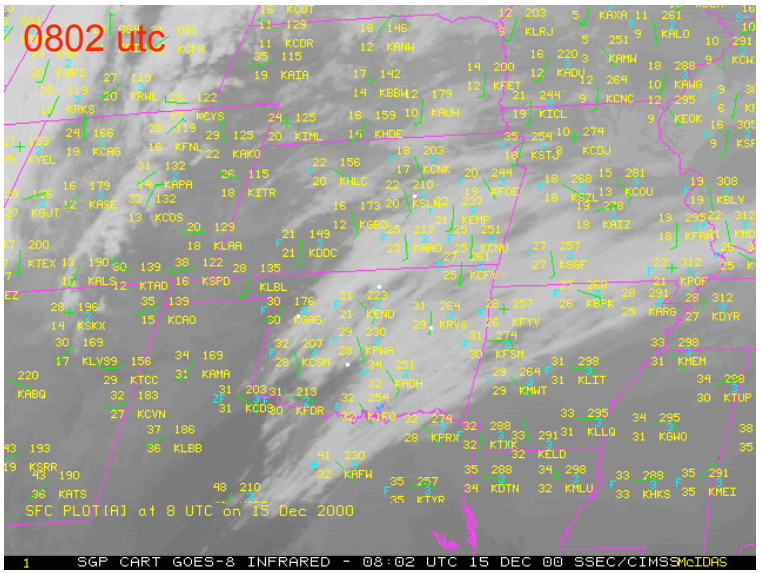
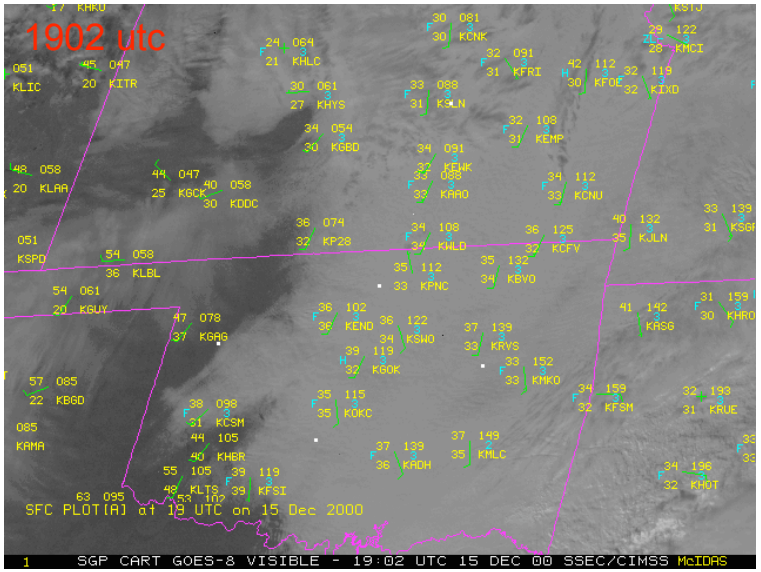
CASE STUDY: 15 Dec 2000 SGP
overpasses at 0807 and 1910 utc

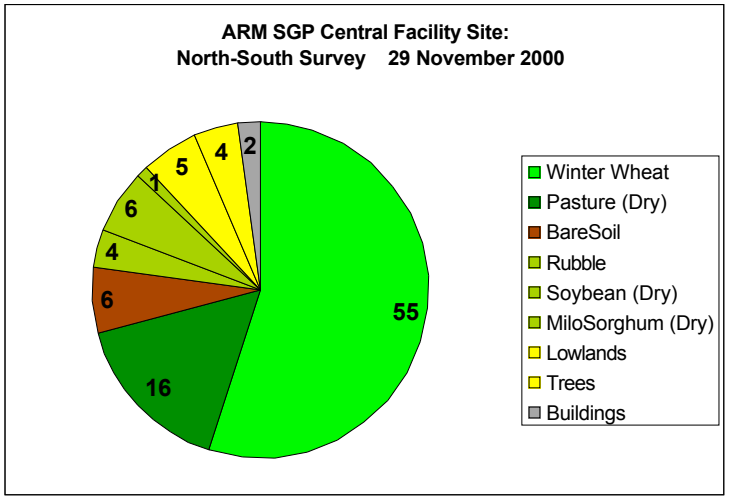


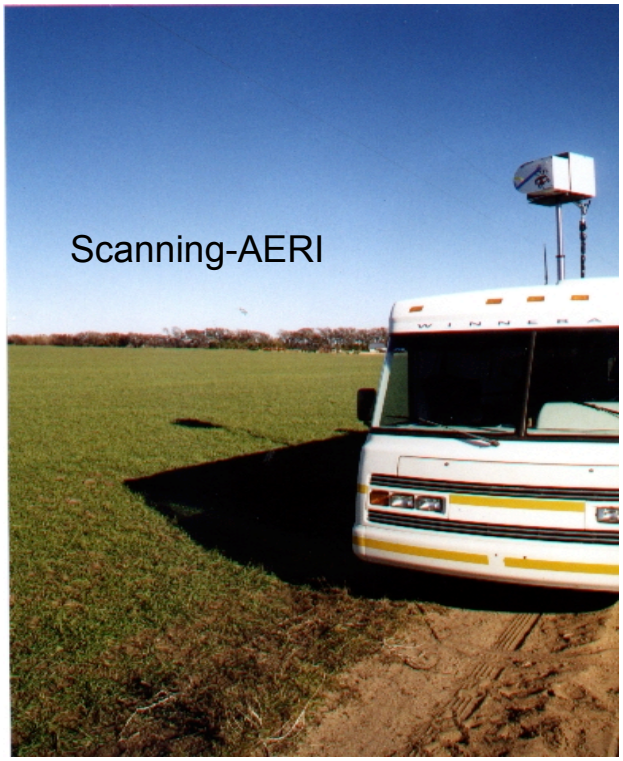


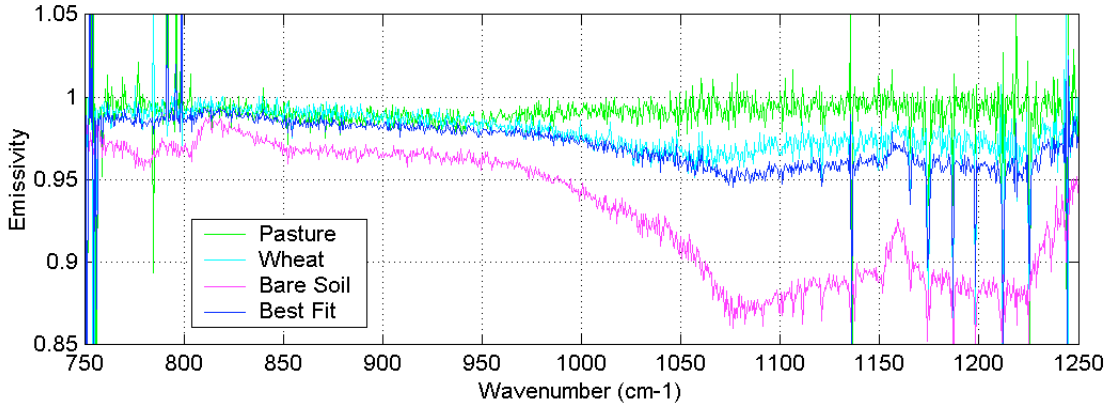


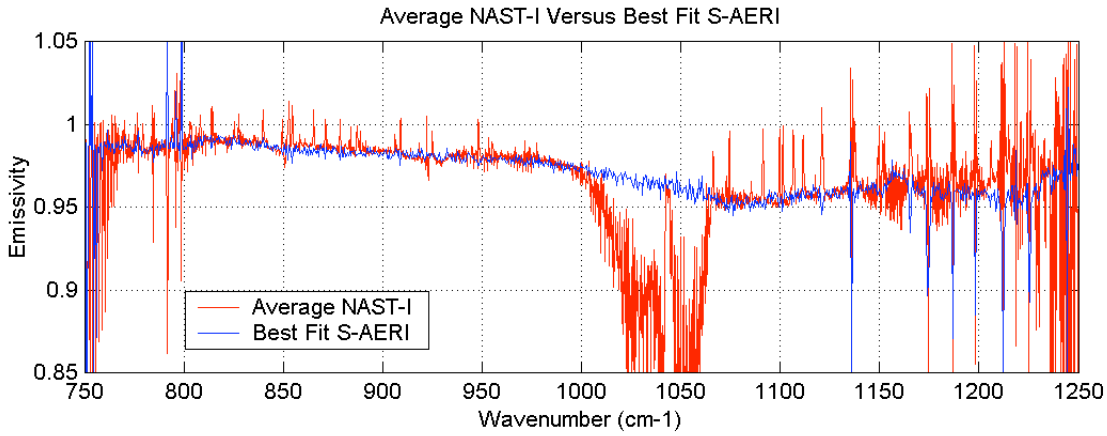
SurfaceType/Emissivity Survey

A survey was conducted on Nov. 2000 and Mar. 2001 to characterize the surface type and spectral emissivity in the vicinity of the ARM SGP Central Facility site.









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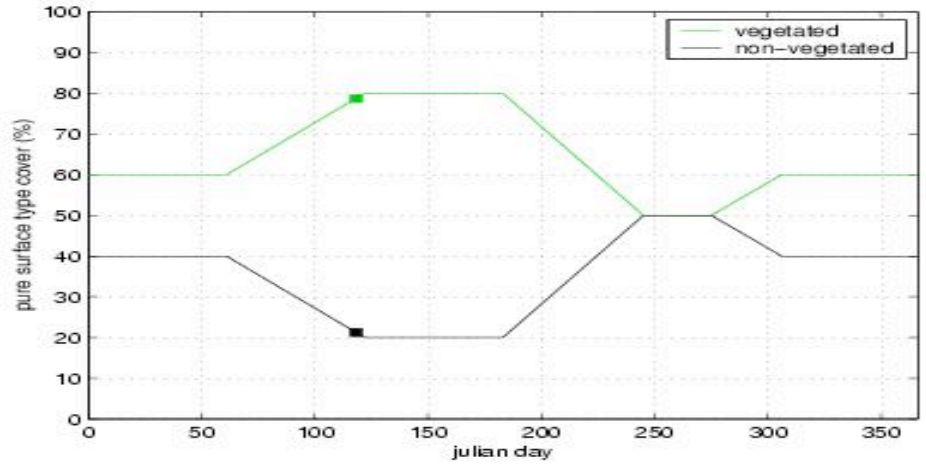
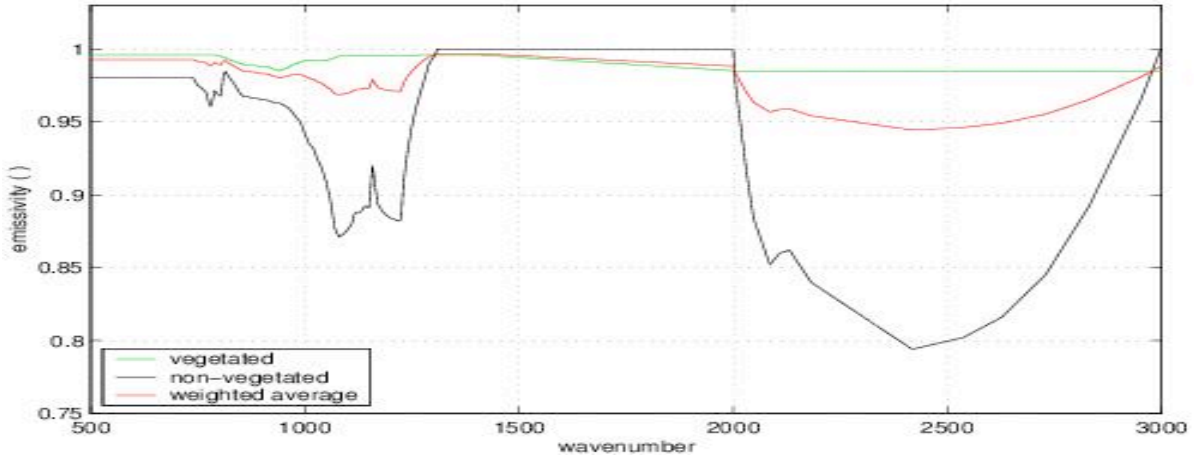
- The Best Estimate surface emissivity is based on measured surface emissivities for vegetated and non-vegetated surfaces and a time varying vegetation fraction.

Vegetation Fraction



Spectral Emissivity



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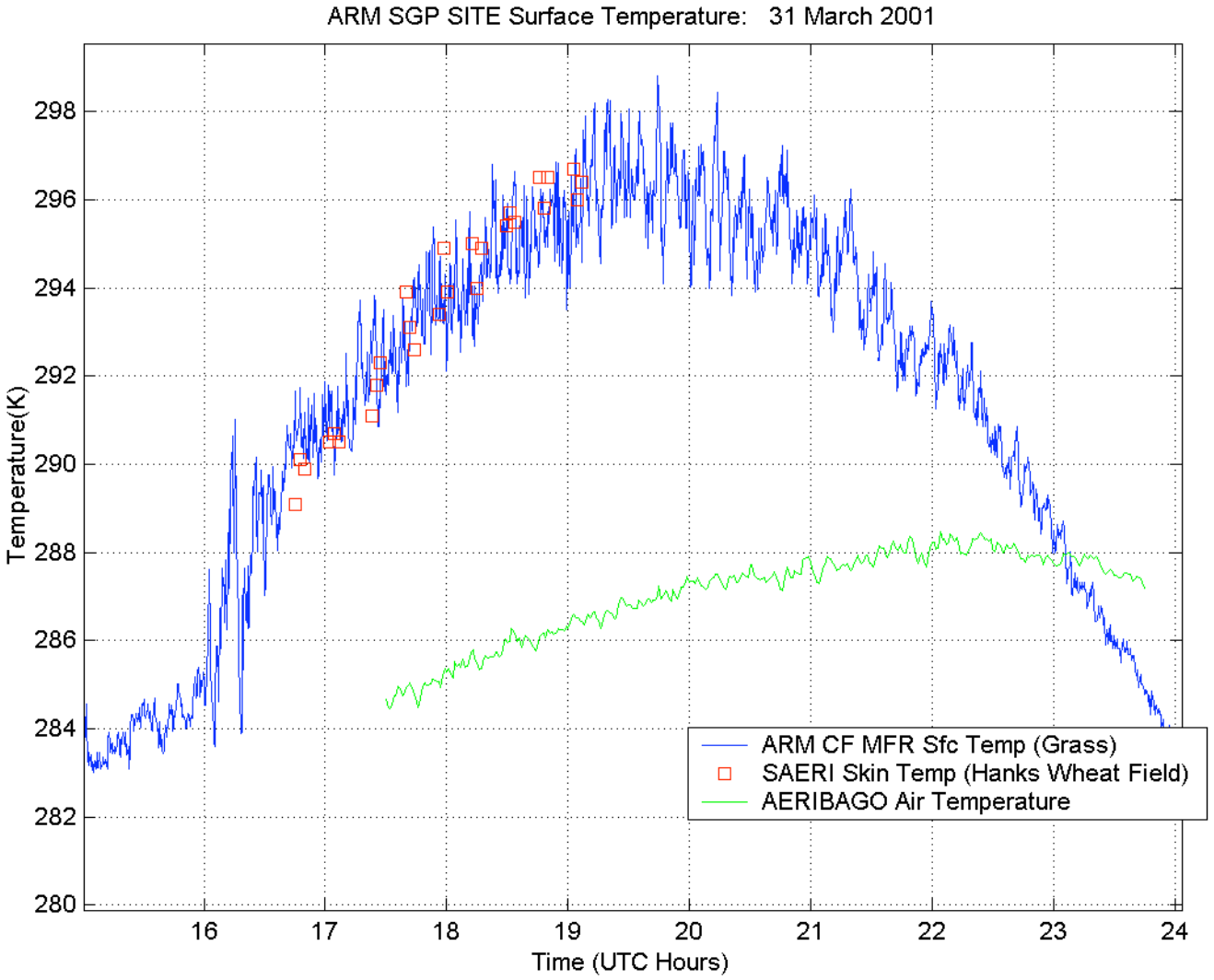
Surface Temperature estimate from downlooking IRT



AIRS ARM Atmospheric State Best Estimate

UW To Do List:

- incorporate uncertainty estimates into data files
- account for radiosonde biases (see WV Validation PPT)
- validate seasonal dependence of vegetation fraction (NDVI ?)
- validate accuracy and representativeness of measured surface temperature
- implement algorithm for NSA and TWP sites
- make AIRS/ARM best estimate data files available to team via an ftp site